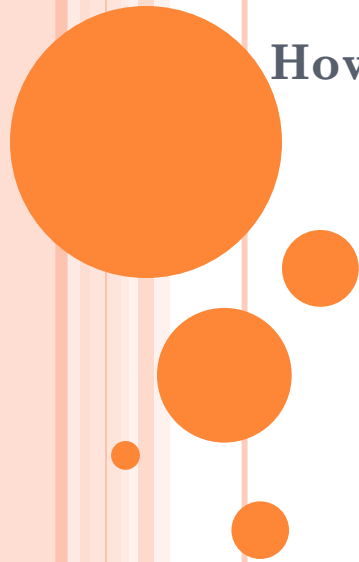


MINERAL ID

How to identify a mineral by its properties



CAN YOU ANSWER THESE QUESTIONS?

- Bob found this mineral. He wants to know what it is and if it is valuable.
 - How does Bob figure out how geologists identify minerals?
 - What properties can Bob use to determine what this mineral is?



A MINERAL'S APPEARANCE HELPS IDENTIFY IT.

- In order to identify a mineral, you need to observe its properties – characteristics that help identify it.
- There are 5 main properties that we use to identify. There are many minor properties that can also help identify a mineral.



REAL LIFE PET MINERALS

- On your desk are TWO mineral samples....
 - (I want them back....)
- As we go through the notes, make observations about your new pet mineral.
- You will have a chance at the end to give it a name....
 - Not Bob or Larry, but its scientific name!
- The more specific & detailed your observations, the better chance you have of finding the mineral's real family name!!!



MINERAL PROPERTY #1

COLOR & STREAK

- The first thing we notice about a mineral is Color.
 - Many people collect minerals based on its color & appearance.
- Color is NOT a good property to use to identify minerals.
 - Many minerals have different colors.
 - Color will send you on the right path towards identifying the mineral.



MINERAL PROPERTY #1

COLOR & STREAK

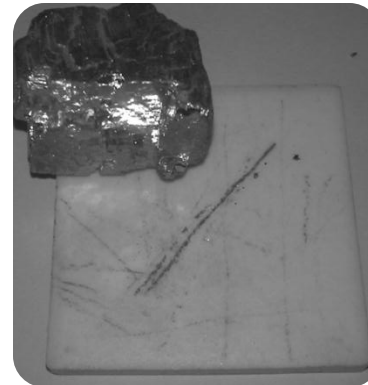
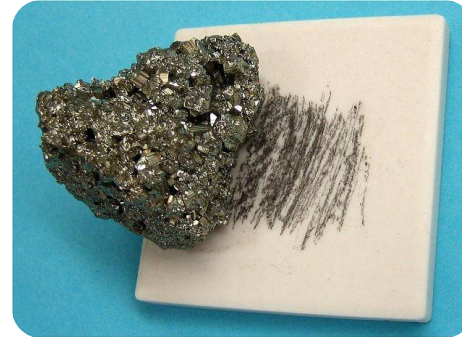
- Since color isn't reliable, geologists use the mineral's streak.
- Streak is the *color of the powder of a mineral*.
 - To test a mineral's streak (powder color), you rub or drag a mineral over a tile of unglazed porcelain (white or black).



MINERAL PROPERTY #1

COLOR & STREAK

- Pyrite (known as "*Fool's Gold*") is always brassy yellow when found in crystals, even broken crystals, of any size; but when powdered, produces a black streak. (Gold's streak is yellow, btw).
- Hematite's streak is blood-red
- Galena's streak is lead gray



PET MINERAL OBSERVATION #1

- What is the color of your mineral?
- What is the streak of your mineral?



MINERAL PROPERTY # 2

LUSTER

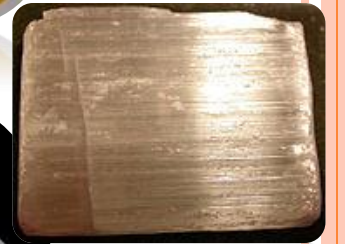
- Luster is the way in which light reflects from the surface.
- The two major types of luster are metallic & nonmetallic.



MINERAL PROPERTY # 2

LUSTER

- Geologists LOVE to name things....
 - So they went a little overboard when naming lusters.(In addition to these, there are many more!)
- **Adamantine** – sparkly, very gemmy crystals - Diamonds
- **Dull** - just a non-reflective surface of any kind. - Kaolinite
- **Greasy** - the look of grease. - Opal
- **Pearly** - the look of a pearl - Muscovite
- **Resinous** - the look of resins such as dried glue or chewing gum - Amber
- **Silky** - the look of silk, similar to fibrous but more compact – Satin spar gypsum
- **Vitreous** - the most common luster, it simply means the look of glass - quartz
- **Waxy** - the look of wax -Jade



PET MINERAL OBSERVATION #2

- What is your mineral's luster?



QUICK CHECK -

- Tell your shoulder partner.
 - Person whose head is closest to the ceiling is A.
 - Person whose chin is closet to the floor is B

- A. What is the first thing someone notices about a mineral?
- B. What do we call the color of the powdered mineral?
- C. Which is more reliable: streak or color?
- D. What are the two types of luster?



MINERAL PROPERTY # 3

HOW A MINERAL BREAKS

- When a mineral breaks it does so either by **fracturing** or by **cleaving**.
- **Cleavage** is the *tendency of a mineral to break along flat surfaces*.
 - Crystal cleavage is a smooth break producing what appears to be a flat crystal face.
- **Fracture** is the *tendency of a mineral to break into irregular pieces*.



Photo from Earth Science Australia
<http://earthsci.org/>

Conchoidal fracture -
curved breakage



Uneven fracture....
need I say more?



PET MINERAL OBSERVATION #3

- Does your mineral show
 - Cleavage – smooth, flat break?
 - Fracture – uneven, random break?



MINERAL PROPERTY #4

HARDNESS

- A mineral's hardness is its resistance to being scratched.
- A scale known as the Moh's scale is often used.

Hardness	Mineral	Description
1	Talc	Fingernail easily scratches it.
2	Gypsum	Fingernail scratches it
3	Calcite	Copper penny scratches it.
4	Fluorite	Steel nail scratches it easily.
5	Apatite	Steel nail scratches it with pressure.
6	Feldspar	Scratches glass
7	Quartz	Scratches streak plate
8	Topaz	
9	Corundum	
10	Diamond	Hardest of all minerals. Only another of its kind will scratch it.

PET MINERAL OBSERVATION #4

- Where on the Moh's scale is your mineral?
 - Scratch it with your fingernail. (1-2)
 - Scratch it with the penny.(3)
 - Scratch it with the nail. (4-5)
 - Scratch the glass (6)
 - Scratch the streak plate. (7)



MINERAL PROPERTY #5

DENSITY

- Each mineral has a specific density.
- Density is the mass of a given space or in scientific terms the mass per unit of volume.
 - Geologists go even more in depth. They measure **SPECIFIC GRAVITY**.
 - The specific gravity of a mineral is its mass divided by the mass of an equal volume of water.



MINERAL PROPERTY #5

DENSITY

- Geologists measure density by the following:
 - First they use a balance to determine the mass of a sample.
 - Second, they place the mineral in water to see how much water it displaces.
 - The volume of displace water = the volume of the sample
 - Third they use the following formula:

$$\text{Density} = \text{Mass}/\text{Volume}$$



PET MINERAL OBSERVATION #5

- In the field adequate to simply 'heft' a specimen to determine whether it is of low, high or moderate weight compared to it's size.
- Does your sample seem light, just right, or heavy for its size?



SOME MINERALS HAVE SPECIFIC PROPERTIES

○ Fluorescence

- some minerals glow when exposed to ultraviolet light

○ Magnetic

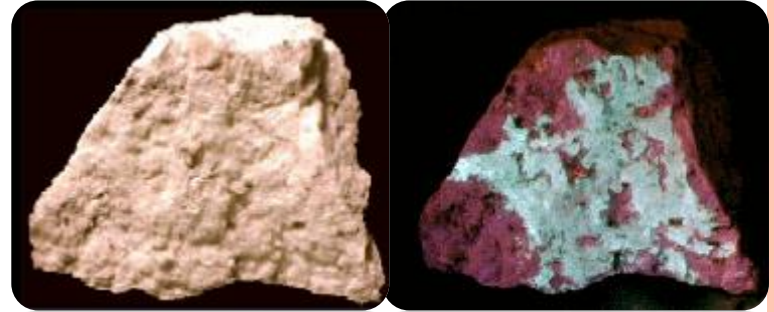
- Some minerals are attracted to magnets

○ Acid

- Some minerals react with acid by bubbling
- Carbonate minerals react with dilute hydrochloric acid.

○ Double refraction

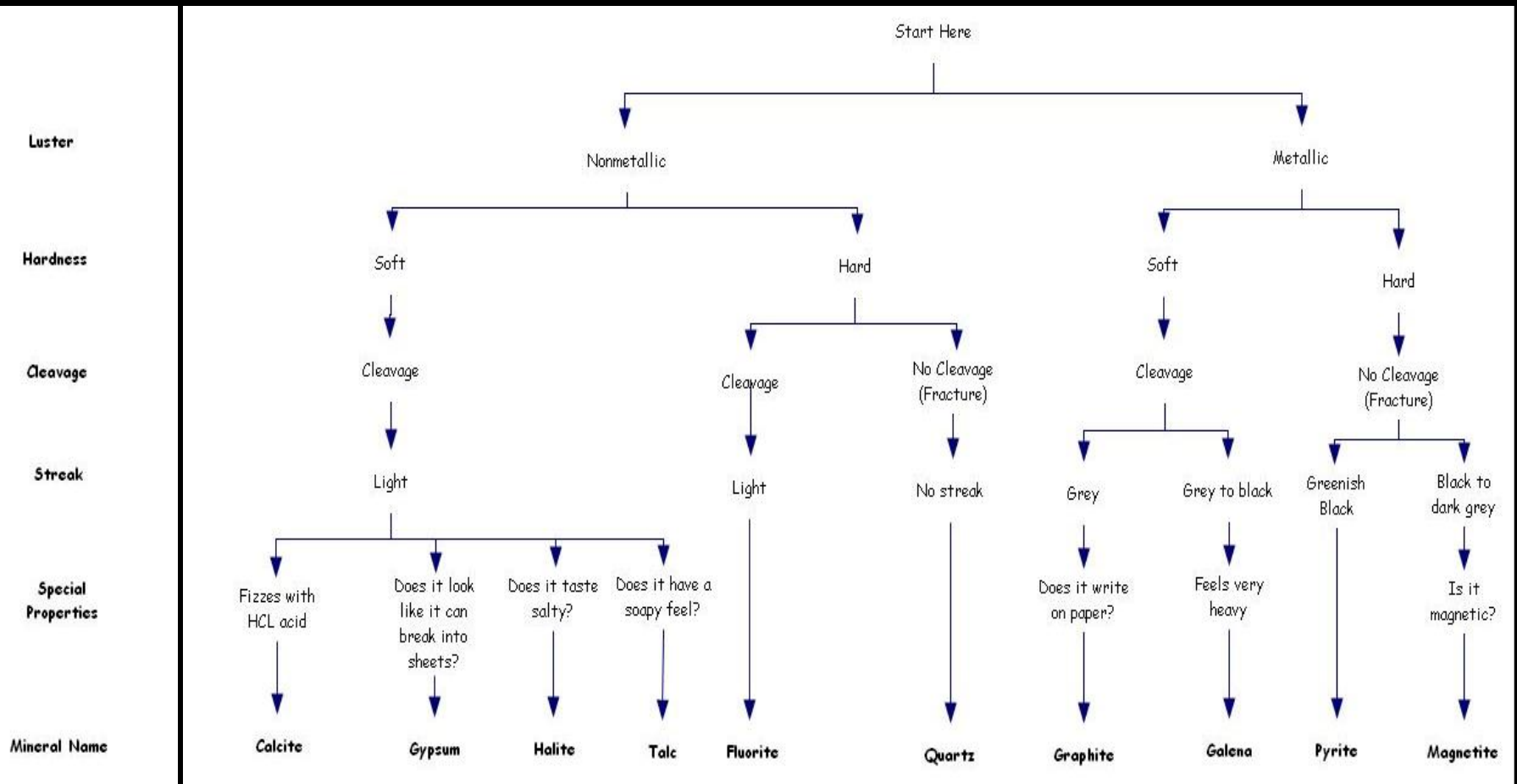
- these minerals split the light into two different rays which gives the illusion of double vision in this Iceland Spar Calcite.



Photos from Earth Science Australia <http://earthsci.org/>

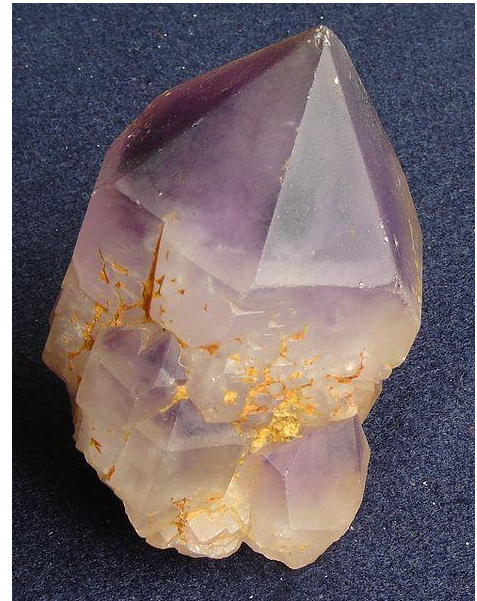


FIND YOUR MINERAL'S NAME



ANSWER THESE QUESTIONS.

- Bob found this mineral. He wants to know what it is and if it is valuable.
- What properties can Bob use to determine what this mineral is?



SLCDFH

SOME LLAMAS CLIMB DOWN FUNNY HILLS

- Streak
 - Powdered Color
- Luster
 - How shiny
- Cleavage
 - Breaks in sheets or blocks
- Density
 - How much mass in a given volume
- Fracture
 - Just crumbles & breaks
- Hardness
 - Can be scratched by

